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ABSTRACT

Although self-rated health is an important topic in social gerontology, relatively few studies have examined the predictors of these self-evaluations. Data from the Second Duke Longitudinal Study were used to examine the relationships among neuroticism, physician-rated health, and self-rated health. Physicians' ratings of health were used to assess objective health status, and self-rated health was predicted concurrently and prospectively in middle-aged and older adults in four test dates at 2-year intervals. Wave 1 and 4 self-ratings of health on a ladder scale were the dependent variables in two separate hierarchical regressions. In each analysis, the independent variables were entered in three steps: (1) control variables (age, sex, income, education); (2) physicians' ratings and neuroticism; and (3) the hypothesized effect, the physicians' ratings by neuroticism interactions. Analyses based on data from the first and fourth test dates on 178 men and 179 women revealed that subjects exhibited average levels of neuroticism, low levels of physician-assessed health impairment, and perceptions of good health. The results indicate that neuroticism and physicians' ratings were substantial, and only additive, contributors to self-ratings of health. (NRB)

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Neuroticism and Physicians' and Self-Ratings of Health

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Abstract

Using data from the Second Duke Longitudinal Study, we predicted that physicians' ratings would be more strongly related to self-ratings at low levels as compared to high levels of neuroticism. Wave 1 and 4 self-ratings of health on a ladder scale were the dependent variables in two separate hierarchical regressions. In each analysis, the independent variables (all measured at wave 1) were entered in three steps: (1) Control variables--sex, age, education, and income; (2) physicians' ratings and neuroticism; and (3) the hypothesized effect, the physicians' ratings by neuroticism interactions. The hypothesis was not confirmed in either analysis. The net R^2s were .004 concurrently and .003 prospectively. The results indicate that neuroticism and physicians' ratings are substantial, and only additive, contributors to self-ratings of health. The net R^2s were .195 concurrently and .098 prospectively.

Neuroticism and Physicians' and Self-Ratings of Health

For both practical and theoretical reasons, self-rated health is an important topic in social gerontology. Practically, self-rated health is of interest because it is an effective predictor of health service utilization (Wan & Soifer, 1974) and mortality (Mossey & Shapiro, 1982). Because self-rated health is only moderately accounted for by objective measures of health status, it is also of theoretical interest. The question is: what other factors explain variations in self-rated health?

Surprisingly, relatively few studies have examined the predictors of self-rated health. Typically, self-rated health has been correlated with self-reports and physicians' ratings of health in an effort to validate measures of self-rated health status (LaRue, Bank, Jarvik, & Hetland, 1979; Maddox & Douglas, 1973; Suchman, Phillips, & Streib, 1958).

Perhaps, the most sophisticated study of self-rated health among the elderly was conducted by Markides and Martin (1979). Using path analysis, they found that self-reported health, income and education had direct effects on self-rated health. Age, sex, and ethnicity indirectly influenced self-rated health; age via its effect on self-reported health, education, and income, sex via its effect on income, and ethnicity (Mexican American) via its effect on education. This study had two shortcomings which make it difficult to interpret the findings. First, the "objective" measure of health status was based on reports made by the respondents. Second,

self-rated health was measured concurrently with the exogenous and intervening variables.

The present study was designed to redress these limitations. Physicians' ratings of health were used to assess objective health status and self-rated health was predicted concurrently and prospectively. Moreover, several investigators have noted that neuroticism is significantly correlated with self-reported and self-rated health (Blazer & Houpt, 1979; Costa & McCrae, 1980; Schroeder & Costa, 1984). Using data from the Second Duke Longitudinal Study, Okun and George (1984) found that neuroticism was only minimally associated with physicians' ratings of health. Therefore, we included a measure of neuroticism as a predictor in the present study.

We hypothesized

(1) Age and sex will not account for a significant amount of variance in self-rated health either concurrently or prospectively.

(2) Education, income and physicians' ratings of health will account for a significant amount of variance in self-rated health both concurrently and prospectively.

(3) Neuroticism will account for a significant amount of variance in self-rated health both concurrently and prospectively.

In addition, we anticipated that individuals low, as opposed to high, in neuroticism would be more likely to base their self-ratings

of health status on "objective" data, such as how often they have been ill. Consequently, we hypothesized that the association between physician-rated and self-rated health would be greater for individuals low, as opposed to high, in neuroticism.

Methods

Sample

To test the hypotheses outlined above, it was necessary to have a longitudinal data base that included measures of neuroticism, physician-rated health and self-rated health. One data base that met these requirements was the Second Duke Longitudinal Study. Subjects were chosen from a list of participants in a health insurance program serving central North Carolina. The sample represents the broad middle class of middle-aged and older adults who do not experience unusual financial or physical difficulties. A detailed description of the sample and research design is available (Palmore, 1974).

The research design included four test dates at 2-year intervals. The first measurements occurred in 1968. Data used in this paper were obtained from the first and fourth test dates. The initial sample consisted of 261 white men and 241 white women, age 46-71. After listwise deletion of respondents with missing data on any variables of interest, the analyses were based on 178 men and 179 women.

Measures

Education was coded simply as years of formal education. Income was total income from all sources coded in ordinal categories ranging from zero (under $1,000) to nine ($15,000+). Neuroticism was measured by the anxiety factor (QII) of the Cattell 16 Personality Factor (PF) test (Cattell, Eber, & Tatsuoka, 1970). Form C of the 16 PF was administered in the Second Duke Longitudinal Study. As is true for all 16 PF factors, values for the neuroticism measure were in the form of stens, a standard score with a population mean of 5.5 and a standard deviation of 2.0. Higher scores indicate greater neuroticism.

A physician rated the health status of Second Duke Longitudinal Study participants on a 10-point scale, with higher scores indicating increased physical impairment. These ratings were based on a thorough physical examination, knowledge of a detailed medical history and the results of routine laboratory tests. The physician-rated health scores were reflected (multiplied by -1) so that higher scores indicate better health. Self-rated health was measured by a ladder scale. Respondents were presented with a picture of a 10-rung ladder, and asked to identify their current positions on the ladder. Higher scores represent perceptions of better health. At the first test date, the ladder scores correlated 56 with scores on a single-item measure in which respondents rated their general health as poor, fair, good, or excellent.

Neuroticism, physician-rated health, income, education, and age were obtained at the first test date. The self-rated health measure was employed from both the first and fourth test dates.

Results

Table 1 presents the means, standard deviations, and correlations among the variables. The sample means suggest that, overall, participants exhibited average levels of neuroticism, low levels of physician-assessed health impairment, and perceptions of good health.

Insert Table 1 about here

Turning to the correlations, several patterns emerge. Sex and age were unrelated to education but moderately related to income. Also, sex and age were minimally related to neuroticism and self-rated health score. Age, but not sex, was related to physician-rated health scores. Income and education were modestly correlated with neuroticism and self-rated health scores and only minimally related to physician-rated health status. As previously observed by Okun and George (1984), neuroticism is more strongly related to self-rated, than physician-rated, health and physician-rated health is moderately correlated with self-rated health. Finally, the autocorrelation for self-rated health scores over a 6-year interval was .52.

We tested the hypotheses of this study using multiple regression. We began the analyses by regressing self-rated health time 1 scores on the six predictors listed in Table 2. The model was significant [$F(6, 350) = 21.01$, $p < .001$], accounting for 26% of the variation in time 1 self-rated health scores. In Table 2, the unstandardized and standardized regression coefficients are presented. As hypothesized, physician-rated health, neuroticism, and income were significant predictors of time 1 self-rated health scores. Contrary to our predictions, age was and education was not related to time 1 self-rated health scores. Examination of the standardized regression coefficients reveals that physician-rated health, by far, was the strongest predictor. Neuroticism, however, was the second most efficient predictor.

Insert Table 2 about here

To determine the unique variance associated with neuroticism, the coefficient of determination for a five predictor model including all predictors in Table 2 except neuroticism was subtracted from the coefficient of determination for the six predictor model in Table 2. Results indicated that neuroticism uniquely explained 3% of the variance.

To ascertain whether neuroticism conditioned the relationship between physician- and self-rated health, an interaction predictor was created by multiplying neuroticism scores by physician-rated

health scores. The coefficient of determination for the six predictor model in Table 2 was subtracted from the coefficient of determination for a seven predictor model including the interaction predictor as well as the six predictors in Table 2. Results indicated that the neuroticism by physician-rated health interaction uniquely accounted for zero variance.

In a second set of analyses, time 4 self-rated health scores were regressed on all six predictors. Results indicated that the overall model accounted for a significant amount of variance ($R^2 = .14$) in time 4 self-rated health scores [$F(6, 350) = 9.81$, $p < .001$]. In Table 3, the unstandardized and standardized regression coefficients are presented. As hypothesized, physician-rated health and neuroticism are significant predictors of time 4 self-rated health scores. Also, as anticipated, age and gender were not significant predictors of time 4 self-rated health scores. Contrary, to our expectations, education and income were not significantly related to time 4 self-rated health scores. Inspection of the standardized regression coefficients reveals that neuroticism was almost as potent as physician-rated health in predicting time 4 self-rated health scores. Again, neuroticism uniquely explained 3% of the variance and the neuroticism by physician-rated health interaction uniquely accounted for zero variance.

Insert Table 3 about here

Discussion

It is interesting to compare the results of the present study with those reported by Markides and Martin (1979). They found that sex was related to income but not self-rated health. Our findings are comparable; gender was correlated with income but was not a significant predictor of self-rated health. Markides and Martin observed that age was related to objective health, income, and education but not related to self-rated health. In the present study, age was related to income and physician-rated health but not related to education. The lack of a relation between age and education reflects the nonrepresentative sampling frame employed in the Second Duke Longitudinal Study. Age was minimally associated with self-rated health on the bivariate level and, while age was a significant predictor of time 1 self-rated health scores, it was not a significant predictor of time 4 scores.

Consistent with the findings of Markides and Martin, on the zero-order level, education and income were related to subjective but not objective health status. However, the findings of the two studies diverge in terms of the direct effects of education and income. On the one hand, Markides and Martin found that income and education had significant direct effects on self-rated health. On the other hand, we found that only income had a direct effect cross-sectionally on self-rated health scores and neither predictor had a direct effect longitudinally on self-rated health scores.

Although different measures of objective health status were employed, in both studies objective health was the most efficient predictor of concurrent self-rated health scores. Comparable amounts of variance were also explained in the two studies. In the Markides and Martin study, 23% of the variance in self-rated health was accounted for by income, education and objective health. In our study, the same percent of variance was accounted for concurrently by income, education, physician-rated health, age and sex.

The proportion of explained variance in self-rated health declined by .12 from time 1 to time 4. Neuroticism and physician-rated health were significant predictors at both time 1 and time 4. Comparing the standardized regression weights of these two predictors at time 1 with those at time 4, it can be seen that physician-rated health is superior to neuroticism as a cross-sectional predictor, but not as a longitudinal predictor.

We found no evidence either cross-sectionally or longitudinally that neuroticism moderates the relationship between physician- and self-rated health. Apparently, the same degree of congruence exists in health ratings regardless of the respondents' level of neuroticism. Thus, physician-rated health and neuroticism are only additive contributors to self-rated health.

One limitation of this study should be noted. The distributions of physician-rated health and self-rated health scores were highly skewed. Possibly, the explained variance in self-rated health would have been larger for the predictors, in general, and for physician-

rated health, in particular, if the sample have been representative of the population.

The most important contribution of this study concerns the implications of our findings for understanding the determinants of self-rated health. Self-rated health appears to be a function of physical health status and emotional health status. Neuroticism, in the form of trait anxiety, varies inversely with self-perceived health status independent of physician-rated health status. Neuroticism, therefore, seems to be a promising variable to incorporate into causal models of variations in self-rated health.

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Table 1

Correlation Matrix, Means, and Standard Deviations for Independent and Dependent Variables

	I	A	S	E	PRH	N	SRH1	SRH2
Income (I)								
Age (A)	-.37							
Sex (S)	-.37	.05						
Education	.41	.03	-.02					
Physician's Rating of Health (PRH)	.10	-.23	.03	.10				
Neuroticism (N)	-.23	.05	.06	-.28	-.08			
Self-Rating of Health at Wave 1 (SRH1)	.21	-.04	-.05	.23	.42	-.27		
Self-Rating of Health at Wave 4 (SRH4)	.13	-.09	-.05	.17	.27	-.26	.52	
Mean	6.31	58.19	.50	12.16	-1.17	5.85	6.94	6.74
Standard Deviation	2.69	7.06	.50	3.96	.67	1.46	1.35	1.47

Table 2

Regression Weights for Predicting SRH1 Scores

Predictor	b	B
I*	.07	.13
A*	.02	.11
S	-.02	-.01
E	.03	.08
PRH***	.83	.41
N***	-.17	-.18

$F(6, 350) = 21.01$, $p < .001$; $R^2 = .26$

*$p < .05$, ***$p < .001$

Table 3

Regression Weights for Predicting SRH4 Scores

Predictor	b	B
I	.05	.10
A	.00	.01
S	-.02	-.01
E	.02	.04
PRH***	.54	.24
N***	-.21	-.20

$F(6, 350) = 9.81$, $p < .001$; $R^2 = .14$

*$p < .001$